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ABSTRACT

Interactive video is achieved by merging the two powerful technologies of microcomputing and video. Using television as the vehicle for display, text and diagrams, filmic images, and sound can be used separately or in combination to achieve a specific training task. An interactive program can check understanding, determine progress, and challenge viewers to inquire. Interactive video is an extremely versatile display medium which allows the use of two communication dimensions--both information delivery and response. Systems, however, are diverse in their capabilities. The key elements of an advanced interactive video system include an authoring facility, interactive presentation, management and analysis, and hardware. Hardware can include a microcomputer; optical videodisc, capacitance videodisc, or videocassette; and, in some systems, an interface controller, touch screen, and/or printer. Training applications have been varied, ranging from medical diagnosis to information delivery and response. Systems, however, are diverse in their capabilities. The key elements of an advanced interactive video system include an authoring facility, interactive presentation, management and analysis, and hardware. Hardware can include a microcomputer; optical videodisc, capacitance videodisc, or videocassette; and, in some systems, an interface controller, touch screen, and/or printer. Training applications have been varied, ranging from medical diagnosis to "surrogate travel." One effective use involves using the system to show the consequences of decisions. This report lists two references and includes figures illustrating interactive video system elements and a typical hardware configuration. (LMM)

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## 2.2 - Interactive Video in Training

by Peter Copeland, Managing Director, Futuremedia Limited

**Interactive video is achieved by merging the two powerful technologies of microcomputing and video. As a one-to-one communications medium, it offers the possibility of accelerating and increasing the effectiveness of learning. The benefits to training generally will be obvious. This presentation will illustrate the concept and its applications.**

The notion that we can improve the way we learn is not new. Imagine what it would mean if we could compress by 50 per cent the time it takes to learn; or if we could provide a method of individual study that consistently made possible 100 per cent success. Previous attempts to use technology to improve the efficiency of training have had some success, but measured by any yardstick, interactive video has the potential to do better.

For one thing, it is an omnibus medium. Using TV as the vehicle for display, text and diagrams, filmic images and sound can be used separately or in combination to achieve a specific training task. Equally important, an interactive programme can check understanding, determine progress and challenge the viewer to enquire. With interactive video, we have an extremely versatile information delivery system which has an intrinsic capability to motivate and sustain interest. These two factors, more than any others, distinguish interactive video from all other media.

### Characteristics of Media

All existing conventional media have limitations in the type of information they can display and the way they can present it. Consider, for example, using print-based training materials to teach someone how to solder, or adjust the carburation setting on a car engine, or light a furnace. All these tasks are frequently described in print form, but they require intricate diagrams and often laboriously detailed text. On the other hand, if video were used to teach these tasks, it could, when supported by narration or a presenter demonstrating the task, improve the efficiency of communication for certain aspects of the message. For other aspects, however, print still is more appropriate.

For instance, you may decide that learning how to solder requires a knowledge of tin/lead alloys, or that adjusting carburation needs an understanding of gas analysis, or that lighting a furnace involves making decisions about appropriate purging substances. So, what at first glance appeared to be manual skills, now include significant cognitive elements. Film and video, because of their transient nature, are not too good at conveying this type of information because for understanding to occur, we need time to identify, categorise and mentally organise what is before us. Print allows us to do this - so do computer generated text and graphics. An ideal medium is thus one that supports a number of message systems, ie text, diagrams, animation, filmic imagery and sound. Because interactive video incorporates all of these elements in one delivery medium, it provides the best of all worlds. We can program text, graphics, audio and video in a sequence which complements each segment of the subject being taught.

### Dimensions of Communication

Interactive video is an extremely versatile display medium, but there are always at least two dimensions to communication - one starts at the delivery of the information, the other develops from the response. Often we are constrained in the use we make of response. For instance, in a large group



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presentation, response, although desirable, is often not solicited because of pressures of time and numbers. In watching video tape, any response on the part of the viewer is, of course, dissipated without any effect on the information source. Suppose, though, that the person learning from the video is able to signal to the programme that the message is not understood; that it is no use carrying on because more help and guidance are needed. Suppose also that the video programme adapts itself accordingly and supplies the necessary help and guidance. At this point, a dialogue is being established between man and machine that can add tremendous value to the communication process. This is the 'interaction' in interactive video.

I have talked about interactive video as though all systems of that name can support all of these functions. This is not the case at present. Systems are diverse in functioning and capability.

**System Elements**

Figure 1 details the four key elements of an advanced interactive video system. The authoring facility enables the teacher, or course author, to create any text and graphics and to assemble and structure the final interactive presentation. In operation, the interactive presentation automatically presents the student with video images, text, questions and options. The student responds using a keypad, computer keyboard, touch-screen or light pen, and either text and/or video branching occurs according to the responses made.

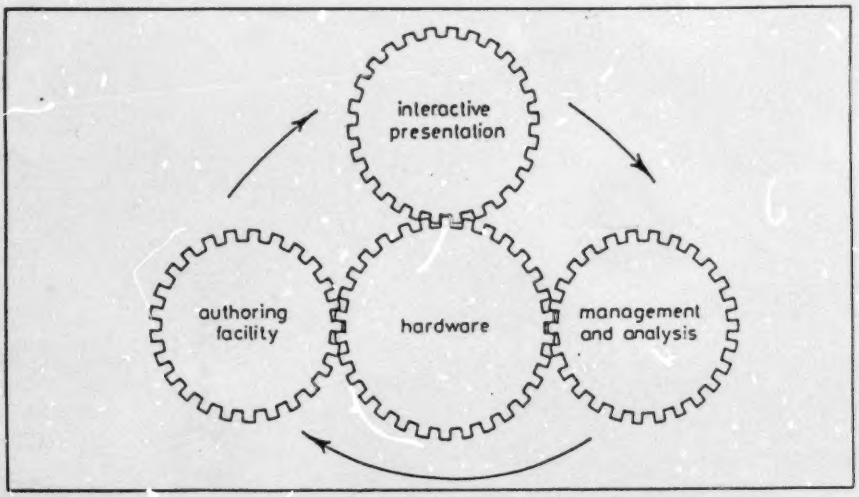


Figure 1 Interactive video system elements ©1983 Futuremedia Ltd.

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|---|---|
| Authoring facility | (Language or system) enables the creation of text and graphics and provides a course structure comprising text, graphics, video and audio. |
| Interactive presentation | utilizing keyboard, keypad or touch screen input etc and video monitor with sound. |
| Management & analysis | student records, student performance analysis, question analysis, group performance and course evaluation. |
| Hardware | comprises videocassette or videodisc, microcomputer, disc or VCR interface controller, image switcher or image overlay facility. |

The analysis and management facility, usually, automatically monitors student response and program effectiveness. With this information, the teacher can again use the authoring facility to revise and improve the effectiveness of the programme. The diagram shows that all elements interlink and are facilitated by the hardware at the centre of the system. Figure 2 shows a typical hardware configuration.

**Hardware**

Essential to the control of any interactive system, is a microcomputer. In very simple systems, this is a microprocessor which is used with just enough memory to control all the peripheral devices and provide limited interaction. In the more advanced systems, a micro or minicomputer is employed to control the storage of text, the patterns of interactior and the peripheral units.

The storage of video is currently achieved using one of three options - optical videodisc, capacitance videodisc, or videocassette. Optical disc storage has the advantage of fast access times, good quality still frame and undeteriorating quality. The penalties associated with disc are the requirement to originate materials to a very high technical standard and the costs of duplication for small quantities. Videotape, on the other hand, is an immediate low-cost medium. Its disadvantage is usually considered to be access time and search accuracy. This is a problem with some low-cost systems, but the more advanced usually operate with very tolerable access times (circa twenty seconds maximum) and provide accurate search facilities.

In advanced interactive video systems, authoring is done on a computer alphanumeric keyboard. Only when the text element is omitted altogether is an alternative 'programmer' used as with the Sony Responder videocassette system. Student response is either achieved using the same keyboard as is used for authoring, or a special, simplified, keypad is provided. Alternatively, some systems provide a touch screen or light pen facility as an option. Finally, the facility to have a permanent record of text is sometimes provided by means of a printer unit.

**Applications**

Interactive video is an emerging process and many applications are currently still at the pilot phase. Point-of-sale interactive videodisc is gaining support in both the USA and UK. Training applications for both tape and disc have been varied and have ranged from medical diagnosis to 'surrogate travel'. In the latter application, the medium can offer the opportunity to 'explore' areas of towns, terrain and buildings vicariously, and subsequently test and challenge the viewer in terms of orientation, area recognition and pathways. Applications for which Futuremedia has produced interactive programmes include industrial plant control, engineering skills, safety procedures, new process technology workshop practices, petrochemical process theory, sales staff training, car maintenance and management skills.

Particularly effective use can be made of the facility provided by the medium to structure decisions. In the case of a program on Management Training, produced by Futuremedia for Mast Learning Systems, typical work situations are depicted in which the viewer has to analyse and decide what he/she would do. The program shows the consequences of the decision taken. This particular program has been produced for use on the CAVIS system and also on optical videodisc, using BBC or Apple Computers.

A range of safety programs, produced for BP and which will be available generally in the petrochemical industry, also make use of constructed situations

Figure 2

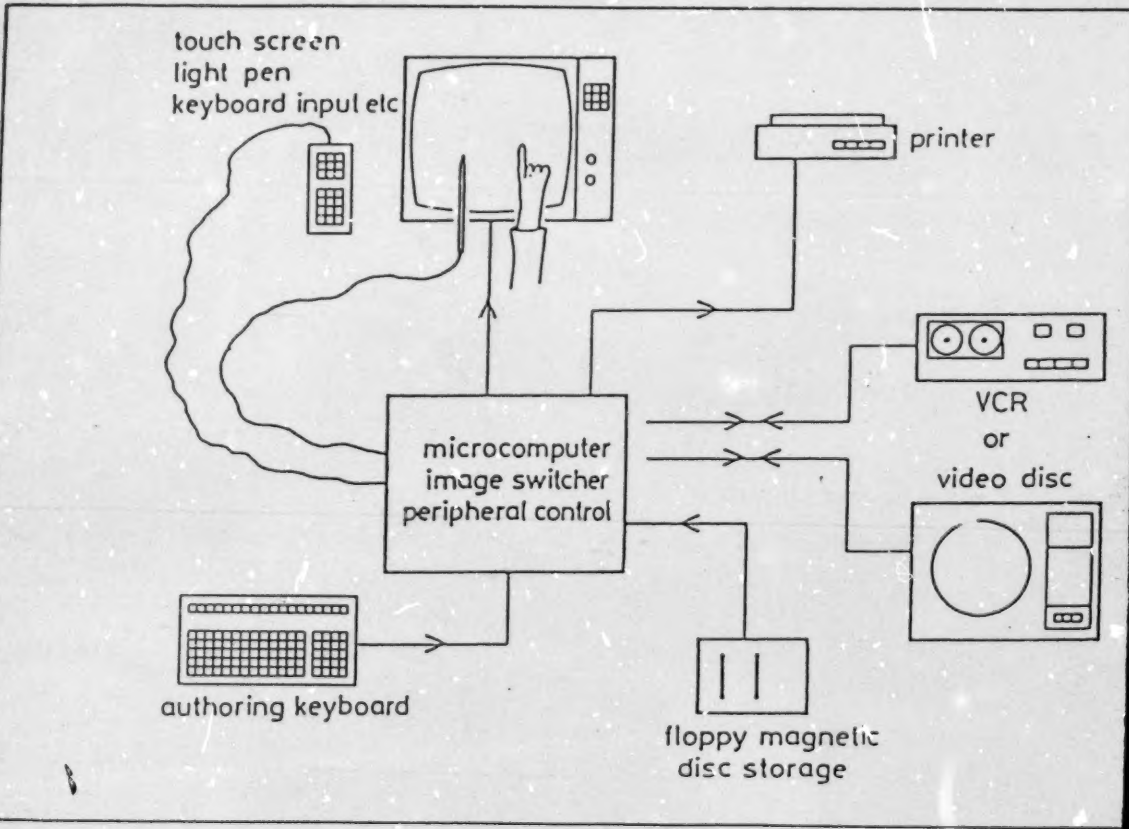


Fig. 2. Hardware configuration for advanced interactive video system

Figure 3 - Peter Copeland with an interactive video disc station based on a specially configured Apple II and Professional Laservision.

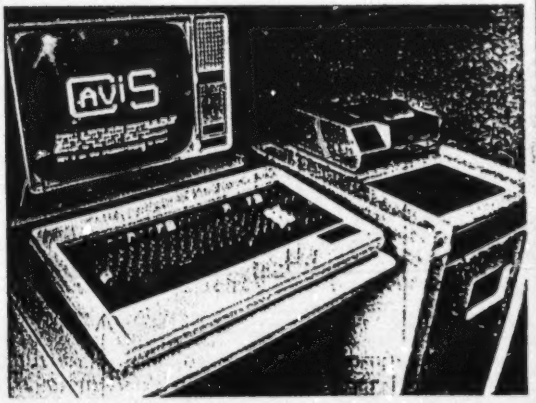


Figure 4 - the CAVIS System

Figure 5 - Management training using an interactive video disc station from Futuremedia. Teletext is overlaid on video and the viewer responds via the Apple keyboard or the infra-red hand held keypad.

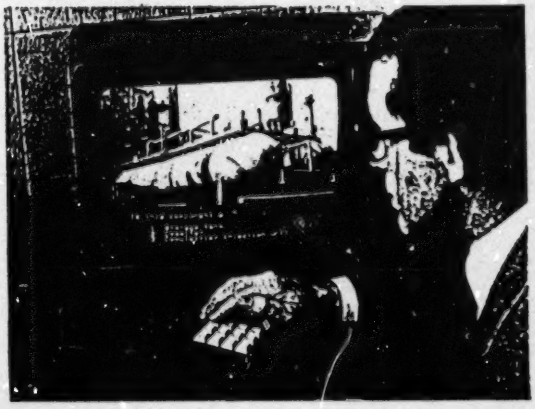

Figure 6 - Scicon's computer audio video instruction system, CAVIS, overcomes the limitations of CAL, videocassette, film, slide-tape, programmed text, videodisc and other interactive video systems by combining all the different media into one teaching and learning system. Photo courtesy SCICON.

to check operators' ability to act appropriately and safely. In one program on the dangers of hydrogen sulphide, the viewer is confronted with a possible hydrogen sulphide casualty. The correct sequence of decisions will determine whether the viewer is competent to save a person's life.

In all these applications, the analysis of the task, and the design and structuring of the content are critical to the effectiveness of the final presentation. But, given that the basic preparation is thorough and a well structured interactive programme is produced, the effect can be a highly engaging and educationally profitable experience.

As the need for effective and efficient learning increases, interactive video is poised to bring considerable benefits to many areas of education and training.

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